

## ExoMol: MOLECULAR LINE LIST FOR EXOPLANETS AND OTHER ATMOSPHERES

JONATHAN TENNYSON, *Department of Physics and Astronomy, University College London, London, IX, United Kingdom*; SERGEI N. YURCHENKO, *Department of Physics and Astronomy, University College London, Gower Street, London WC1E 6BT, United Kingdom*; OLEG POLYANSKY, *Department of Physics and Astronomy, University College London, London, IX, United Kingdom*.

The discovery of extrasolar planets is one of the major scientific advances of the last two decades. Thousands of planets have now been detected and astronomers are beginning to characterize their composition and physical characteristics. To do this requires a huge quantity of spectroscopic data most of which are not available from laboratory studies. The ExoMol project [1] is generating a comprehensive solution to this problem by providing spectroscopic data on all the molecular transitions of importance in the atmospheres of exoplanets. These data are widely applicable to other problems such studies on cool stars, brown dwarfs and circumstellar environments as well as industrial and technological problems on earth. ExoMol employs a mixture of first principles and empirically tuned quantum mechanical methods to compute comprehensive and very large rotation–vibration and rovibronic line lists. Results span a variety of closed (NaH, SiO, PN, NaCl, KCl, CS) and open (BeH, MgH, CaH, AlO, VO) shell diatomics to triatomics (HCN/HNC, SO<sub>2</sub>, H<sub>2</sub>S, H<sub>3</sub><sup>+</sup>), tetratomics (H<sub>2</sub>CO, PH<sub>3</sub>, SO<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>), plus methane [2] and nitric acid [3]. This has led directly to the detection of new species in the atmospheres of exoplanets [4]. A new comprehensive data release has just been completed [5]. Progress on and future prospects of the project will be summarised.

## References

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